

REMARKS/ARGUMENTS

Claims 1-20 are pending in the application.

Claim Rejections – 35 U.S.C. §102 – claims 1, 2, 4-6, 10-15, 17 and 18

Claims 1, 2, 4-6, 10-15, 17 and 18 have been rejected as allegedly anticipated by U.S. Pat. No. 5,839,640 to Kinnaird. In order for a prior art reference to be anticipating, it must disclose each and every element set forth in the claim. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987); MPEP § 2131. Applicants respectfully traverse rejection of claims 1, 2, 4-6, 10-15, 17 and 18, as Kinnaird does not disclose each and every element of the claims.

The Examiner asserts that Kinnaird teaches a wire bonding machine comprising two bonding heads (150, 152) with wire bonding tools (202, 212) mounted thereto, and having a portion that is pivotable “about both vertical and horizontal axes”.

Independent claim 1 is directed to a wire bonding machine for bonding a wire to a semiconductor device and recites, *inter alia*:

... a wire bonding head having a bonding tool mounted to it, the bonding tool adapted to attach a wire end to a semiconductor device, the bonding head having at least a portion which is pivotable about a first horizontal axis, the bonding tool being mounted to the pivotable portion so as to be vertically movable, the bonding head being rotatably mounted to the bonding machine so as to permit **rotation of the bonding tool about a vertically oriented rotational axis**; ... (emphasis added)

Independent claim 4 is also directed to a wire bonding machine for bonding a wire to a semiconductor device and recites, *inter alia*:

... a wire bonding head having a bonding tool mounted to it, the bonding head being mounted to the wire bonding machine so as to permit vertical displacement and rotational displacement of the wire bonding tool, **the rotational displacement being about a vertical axis**; ... (emphasis added)

Independent claim 10 is directed to a wire bonding machine for bonding a wire to a semiconductor device and recites, *inter alia*:

... a wire bonding head including a bonding tool secured thereto, the bonding head rotatably mounted to the wire bonding machine to permit rotation of the bonding tool about a rotational axis, **the rotational axis substantially vertical with respect to the horizontal plane.** (emphasis added)

Each of the independent claims rejected based upon Kinnaird thus recites rotation of a wire bonding tool about **a vertical axis.**

Kinnaird discloses a multiple-tool wire bonder having a single head to create interconnections in a first direction with a first tool and a second tool to create interconnections in a second direction. More particularly, the first tool 50 (as well as first tools 150, 250, and 350 in second, third and fourth embodiments, respectively) and the second tool 52 (along with second, third and fourth embodiment second tools 152, 252, and 352, respectively) are disclosed to move vertically up and down by rotation about a horizontal axis by a Z direction positioner 62 (162, 262, 362). Kinnaird does not explicitly define the orientation of the X, Y, and Z directions in free space, but indicates movement of the Z positioner being used to “lower” the first tool 50 (see column 3, line 50), indicating that the Z direction corresponds to the vertical direction. In combination with the drawings (for example, Fig. 5, indicating movement of first and second tools 150 and 152 in a vertical direction by rotation about a horizontal axis coinciding with a longitudinal axis of rod 161), the artisan of ordinary skill in the pertinent art would recognize that Kinnaird discloses vertical movement of a bonding tool by rotation about a horizontal axis.

It is noted that, contrary to the Examiner’s assertion, Kinnaird does not disclose rotation of a wire bonding tool about a vertical axis, as recited by each of the presently pending independent claims 1, 4 and 10 rejected under 35 U.S.C. 102(b) based on Kinnaird. In none of the embodiments disclosed are the wire bonding tools (along with capillary tubes 202 and 212) disclosed to be rotatable about a vertical axis.

Because Kinnaird does not disclose rotation of a wire bonding tool about a vertical axis, as recited in claims 1, 4 and 10, these claims are not anticipated by Kinnaird. Claim 2, which depends from claim 1, claim 5 and 6, which depend from claim 4, and claims 11-15, 17 and 18,

which depend from claim 10, are also not anticipated by Kinnaird at least by virtue of their dependency upon claims 1, 4 and 10, respectively. As Kinnaird fails to disclose each and every element of claims 1, 2, 4-6, 10-15, 17 and 18, Applicants respectfully submit that claims 1, 2, 4-6, 10-15, 17 and 18 are not anticipated by Kinnaird, and request that the rejection of these claims under 35 U.S.C. § 102(b) be withdrawn.

It is also respectfully submitted that Kinnaird does not render these claims obvious since no modification can be made to Kinnaird without substantially changing the design. As shown in the figures and discussed in detail in Kinnaird, the bonding heads are arranged to rotate about a horizontal axis. In particular, the bonding heads are mounted on a common horizontal shaft which inhibits lateral (side-to-side) motion. As such, any suggestion to have the bonding heads in Kinnaird rotate about a vertical axis would require eliminating the horizontal shaft. This, in turn, would prevent the bonding head in Kinnaird from moving vertically (pivoting about the horizontal axis), thus defeating the whole purpose of Kinnaird. It is well settled law that there can be no motivation to combine references if the combination will prevent the intended operation of the principle reference. Thus, a person skilled in the art would not be motivated to modify Kinnaird to have it rotate about a vertical axis.

It is, therefore, respectfully submitted that the pending claims in the present application are patentable over Kinnaird, alone or in combination with any other references of record.

Claim Rejections – 35 U.S.C. §102 – claims 1, 3-15 and 18-20

Claims 1, 3-15, and 18-20 have been rejected as allegedly anticipated by U.S. Pat. No. 6,122,307 to Koseki. The Examiner asserts in pertinent part that “Koseki teaches a wire bonding machine comprising a wire bonding head (1) with a wire bonding tool (4) mounted to it (figure 1 and col 5 lines 21-50)... .” Applicants respectfully traverse rejection of claims 1, 3-15 and 18-20, as Koseki does not disclose each and every element of the claims.

As discussed above relative to the rejection of claims 1, 2, 4-6, 10-15, 17 and 18 as anticipated by Kinnaird, independent claims 1, 4 and 10 are each directed to a wire bonding machine for bonding a wire to a semiconductor device and recite rotation of a wire bonding tool

about a vertical axis. Similarly, independent claim 3 is directed to a wire bonding machine for bonding a wire to a semiconductor device and recites, *inter alia*:

... a wire bonding head having a bonding tool mounted to it, the bonding tool adapted to attach a wire end to a semiconductor device, **the bonding tool being rotatable** alone or in combination with at least a portion of the bonding head about an axis extending along a substantially horizontal axis, and **about an axis extending along a substantially vertical axis**; (emphasis added)

Accordingly, each of the independent claims that has been rejected as anticipated by Koseki recites rotation of a wire bonding tool about a vertical axis.

Koseki discloses a manufacturing method for a solid state laser. In a portion of the method, a laser diode is secured to a substrate. Koseki discloses a bonder 1 having a bonding tool 4 “which acts to hold by attraction various components such as a solid state laser oscillator element in their horizontal positions above the X-Y table 3” (see column 5, lines 29-33). The position of the bonding tool 4 is controlled by rotation of an attracting head 4A of the bonding tool 4 about vertical and horizontal axes (see column 5, lines 51-64). The attracting head 4A is movable in a horizontal plane by means of a Z-axis rotation servo motor 13 and is movable in a vertical plane by means of a Y-axis rotation servo motor 14 (see column 5, lines 51-63). Koseki further discloses use of a wire bonder to connect terminals of the laser diode to printed wiring on the back side of a substrate 2 upon which the laser diode is mounted. In particular, Koseki discloses (see column 8, lines 5-8):

... [a]ny known wire bonder, **not shown**, may be used to provide the connection between the terminals of the laser diode 23 and the printed wiring through the lead wires 25. (emphasis added)

The foregoing quotation is the sole reference in Koseki to a wire bonder.

Koseki does not disclose rotation of a wire bonding tool about a vertical axis, as recited by each of the presently pending independent claims 1, 3, 4 and 10 rejected under 35 U.S.C. 102(b) based on Koseki. Contrary to the Examiner’s assertion, Koseki does not disclose “a wire bonding machine comprising a wire bonding head (1) with a wire bonding tool (4).” The bonding machine (1) of Koseki is not a wire bonder and the bonding head (4) of Koseki is not a

wire bonding head. Indeed, the only reference of Koseki to a wire bonder makes clear that a wire bonder is not even illustrated in the drawings of Koseki. Rather than wire bonding, the function of the bonding tool 4 and attracting head 4A is to obtain a laser diode 23 from a supply tray 6, and hold the laser diode 23 while placing it in the proper position relative to a substrate 2 while the laser diode 23 is secured to the substrate 2. The wire bonder (not shown) subsequently wire bonds the laser diode 23 to the substrate (see column 7, line 28 through column 8, line 8). The wire bonder disclosed (but not illustrated) by Koseki is not disclosed to have a wire bonding tool which is rotatable about a vertical axis. The device that the Examiner has asserted as the rotational bonding head is simply a holder for holding and transferring a laser diode.

Because Koseki does not disclose rotation of a wire bonding tool about a vertical axis, as recited in claims 1, 3, 4 and 10, claims 1, 3, 4 and 10 are not anticipated by Koseki. Claims 5-9, which depend from claim 4, and claims 11-15 and 18-20, which depend from claim 10, are also not anticipated by Koseki at least by virtue of their dependency upon claims 4 and 10, respectively. As Koseki fails to disclose each and every element of claims 1, 3-15 and 18-20, Applicants respectfully submit that claims 1, 3-15 and 18-20 are not anticipated by Koseki, and request that the rejection of these claims under 35 U.S.C. § 102(b) be withdrawn.

It is also respectfully submitted that Koseki does not render these claims obvious since there is no motivation to add the missing features to the device in Koseki. Koseki is designed to manipulate laser diodes onto a substrate. If a bonding head were also added to the device in Koseki, it would not be possible for the wires to attach the leads on the laser diode since the wire bonding head would rotate in conjunction with the holder that holds the laser diode. The only apparent way that wire leads from the laser diode could be attached is when the bonding head is separate from the holder in Koseki (which is exactly what is disclosed in Koseki). As such, any modifications to Koseki to add a bonding head to the device would result in the Koseki device being inoperable for its intended purpose. Accordingly, a person skilled in the art would not be motivated to make any such modification.

It is, therefore, respectfully submitted that the pending claims in the present application are patentable over Koseki, alone or in combination with any other references of record.

Allowable Subject Matter

Applicants acknowledge with appreciation that claim 16 has been found to be allowable if rewritten in independent form. However, in view of the foregoing comments, Applicants respectfully request reconsideration of claim 16 in its original dependent form.

CONCLUSION

In view of the foregoing amendment and remarks, Applicants respectfully submit that the present application, including claims 1-20, is in condition for allowance, and such action is respectfully requested. If direct communication will expedite the allowance of the application, the Examiner is invited to telephone the undersigned attorney for applicant.

Respectfully submitted,

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